REMARKS

In response to the Examiner's claim objections, Claims 2-5 have been amended as suggested by the Examiner. No new matter has been added.

Claims 2-5 and 18 have been rejected under 35 USC 112, first paragraph, for not having support for the language "forming a recrystallized state in the drawn heat exchanger tube material after producing step, coiling step, uncoiling step or combination thereof," "the drawn tube material is subjected to quality control during or after producing step or coiling step" and "the drawn heat-exchanger tube material is flushed with inert gas during or after producing step, coiling step, uncoiling step, straightening step or forming step".

With respect to the claim language of "forming a recrystallized state in the drawn heat exchanger tube material after producing step, coiling step, uncoiling step or combination thereof", support for the recrystallization of the tubes can be found in the first paragraph on page 8 of the clean substitute specification where it is stated, "The so-called bright-annealing operation which is preferably carried out under an inert gas atmosphere is used to subject the tubes to recrystallization and to prepare them again in their "soft" state for forming under bending conditions." However, there is no recitation in Claim 18 requiring the formation of a recrystallized state in the drawn heat exchanger tube material after producing step, coiling step, uncoiling step or combination thereof. With respect to Claim 2, Claim 2 requires that the drawn tube material or the tube portions are subjected to quality control. Support for this amendment can be found in the last paragraph on page 6 of the specification. Claim 3 requires that the drawn heat-exchanger tube material be flushed with inert gas. Support for this amendment can be found in the first paragraph on page 7 of the clean substitute specification. As such, the rejection of Claims 18, 2 and 3

for not being supported by the specification clearly is in error.

Applicants respectfully request that the Examiner reconsider the withdrawal of Claims 19-23 from consideration due to a constructive election by original presentation. Originally presented Claim 1 states in step c) that the annealing and subsequent cooling step is either before or after cutting. Therefore, this language was in the originally presented claims which were subjected to a first office action without a restriction requirement by the Examiner. Since this language was in originally presented Claim 1, Claims 18 and 19 are clearly supported by Claim 1 and not subject matter presented for the first time when Claims 18 and 19 were added to the prosecution of the present application. Reconsideration of the restriction requirement is respectfully solicited.

Claim 18, lines 11 and 12, have been rejected under 35 USC 112, second paragraph, for not having support for "the drawn heat-exchanger tube material". Support for this language can be found in the first step in Claim 18 and this also applies for Claims 2-4. With respect to "the direction" in Claim 4, there is only one direction which is counter to the direction in which the drawn heat-exchanger tube material is uncoiled as there is only one center of a circle and one end of a line opposite to another end. Therefore, given the specificity in which the claim language is directed, the use of the word "the" is appropriate and the use of the article "a" would be inappropriate. With respect to "the quality control" in Claim 5, Claim 5 is dependent on Claim 2 in which "quality control" is recited. Accordingly, the rejection of the claims under 35 USC 112, second paragraph, clearly is in error.

Claims 18 and 2-5 have been rejected under 35 USC 103(a) as being unpatentable over Uhlmann et al '566 in view of Uhlmann et al '449 and further in view of Franks. Once again

Applicants respectfully traverse this ground of rejection and urge reconsideration in light of the following comments.

As pointed out previously, lamellar U-shaped heat-exchanger tubes are conventionally produced in the form of a coil from a tube manufacturer, uncoiled by the heat-exchanger manufacturer, cut to the desired length and bent to form the U-shaped tubes. When the tubes are uncoiled, they are subjected to an acceleration and braking process which makes the thin-wall tubes susceptible to buckling. Due to the delivered tubes being typically tightly wound in a coil in order to reduce the transport volume of the container, problems are created during the handling of the tubes once they are removed from the transport containers and bend-straightening procedures, carried out under longitudinal tensile stresses, to return the tubes to a straight condition result in a reduction in the average outside diameter of the tubes and a reduction in wall thickness thereof in the outer expansion region, an increase in wall thickness in the inner compression region and flattening and ovalization of its cross-sectional area. Softening and recrystallization, which occur during the bright-annealing of the highly hardened heat-exchanger tubes, which are in the form of tightly wound coils, lead to an adaption of the tubes cross-sections to the geometrically constrained conditions of the coil and, therefore, to changes in the shape of the tubes cross-section and in the layer diameters of individual turns.

The present invention overcomes these problems by requiring that tube-drawing operation be immediately followed by an economical method for the production of hairpin tubes. In accomplishing this purpose, the expenditure on the transport and handling of the coiled and relatively sensitive semi-finished production is kept as low as possible. These advantages are achieved by the fact that the otherwise usual winding of the hardened heat-exchanger tubes to form multi-layered narrow-radius coils that are limited in weight and the stack-wise annealing of those coils in a bright-annealing

furnace are circumvented and therefore the disadvantages of tightly wound tubes discussed above, are prevented. It is once again respectfully submitted that the references cited by the Examiner do not disclose the presently claimed invention.

Uhlmann et al '566 discloses the interconnecting of several lengths of tubes, either in advance by welding or brazing, or on-line by hollow plugs, and the feeding of the tubes through an annealing furnace, a jacketing station and a cutter whereby a flushing gas such as air, oxygen-enriched air or an inert gas are sucked through the respective training end. As admitted by the Examiner, this reference does not disclose coiling the drawn heat-exchanger tube material horizontally in a round open-top container, uncoiling the drawn heat-exchanger tube material from the container or bending the tube portions in a U-shape. Since Uhlmann et al '566 is not concerned with the formation of lamellar heat exchanger tubes which are bent in a hairpin shape, the problems associated therewith are not appreciated by this reference.

Uhlmann et al '449 shows the drawing of copper tubing through a die by means of a rotating drum to which the front end of the tube is fastened and may remain fastened as the drawn tubing is coiled on the drum, or the front is released, so that the frictional engagement of multiple coils on the drum provide for pulling. This reference has been cited by the Examiner as disclosing the coiling of the drawn heat-exchanger tube material horizontally in an open-top container and uncoiling the drawn heat-exchanger tube material from the container. However, once again there is no suggestion in this reference regarding the problems associated with the manufacture of lamellar heat-exchanger tubes which are bent in a hairpin shape and the avoidance of these problems by following the presently claimed process steps which provide a softening and recrystallization state after the annealing and subsequent cooling of the drawn heat-exchanger tube material to eliminate the problems associated with tightly coiled and

soft tubes. Therefore, this reference does not cure the deficiencies contained in the previously discussed reference.

The Franks reference discloses a method of cutting an elongated tube and apparatus therefore in which tube portions are bent in a U-shape. The disclosure of heating the tube to 650°C to evaporate oil in Uhlmann '566 does not lead to the invention disclosed in Franks which discloses a different production method for U-shaped tubes for heat-exchangers. As such, since Franks has no disclosure of a drawn heat-exchanger tube material being subjected to an annealing and cooling step prior to being bent in a U-shape to avoid the problems associated with the transport of a hardened tubing, this reference in combination with the previously discussed references does not present a showing of prima facie obviousness under 35 USC 103(a).

As discussed previously, the present invention has the advantages in that the otherwise usual winding of the hard heat-exchanger tubes to form the multi-layered narrow-radius coils that are limited in weight and the stack-wise annealing of those coils in a bright-annealing furnace are circumvented and disadvantages such as changes in cross-sectional shape in the form of ovalization, wall thickness changes, and homogeneous stress distribution and a large amount of waste lengths are eliminated. The Examiner is respectfully requested to reconsider the present application and to pass it to issue.

Respectfully submitted,

TFC/smd

Terryence F. Chapman

FLYNN, THIEL, BOUTELL & TANIS, P.C.
2026 Rambling Road
Kalamazoo, MI 49008-1631
Phone: (269) 381-1156
Fax: (269) 381-5465

Terryence F. Chapman Reg. No. 32 549
Mark L. Maki Reg. No. 36 589
Liane L. Churney Reg. No. 40 694
Brian R. Tumm Reg. No. 36 328
Heon Jekal Reg. No. 64 219
Eugene J. Rath III Reg. No. 42 094
Dale H. Thiel Reg. No. 24 323
David G. Boutell Reg. No. 25 072
Sidney B. Williams, Jr. Reg. No. 24 949

Encl: Postal Card